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<u>L6</u>	L5 and closure	18	<u>L6</u>
<u>L5</u>	L4 and virtual and class	545	<u>L5</u>
<u>L4</u>	(717/108   717/116   717/140   717/141   717/142   717/143   717/144).ccls.	1673	<u>L4</u>
<u>L3</u>	sweeney.ab.	5	<u>L3</u>
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<u>L1</u>	(virtual ADJ function) and offset	227	<u>L1</u>

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<u>L11</u>	L10 and virtual and class	283	<u>L11</u>
<u>L10</u>	(717/108  717/116  717/140  717/141  717/142  717/143  717/144).ccls.	1043	<u>L10</u>

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<u>L9</u>	L7 and offset	19	<u>L9</u>
<u>L8</u>	L7 and object	39	<u>L8</u>
<u>L7</u>	L5 and inlining	41	<u>L7</u>
<u>L6</u>	L5 and closure	18	<u>L6</u>
<u>L5</u>	L4 and virtual and class	545	<u>L5</u>
<u>L4</u>	(717/108  717/116  717/140  717/141  717/142  717/143  717/144).ccls.	1673	<u>L4</u>
<u>L3</u>	sweeney.ab.	5	<u>L3</u>
<u>L2</u>	L1 and sweeney.ab.	0	<u>L2</u>

L1 (virtual ADJ function) and offset

227 L1

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### 1 [A real-time Java virtual machine with applications in avionics](#)

 Austin Armbruster, Jason Baker, Antonio Cunei, Chapman Flack, David Holmes,

Filip Pizlo, Edward Pla, Marek Prochazka, Jan Vitek

December 2007 **ACM Transactions on Embedded Computing Systems (TECS)**, Volume 7 Issue 1

Publisher: ACM

Full text available:  [pdf\(1.18 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper reports on our experience with the implementation of the Real-time Specification for Java on the Ovm open source Java virtual machine. We describe the architecture and main design decisions involved in implementing real-time Java on Ovm. We ...

**Keywords:** Avionics, Real-time Java, memory management, virtual machines

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### 2 [Automatic feedback-directed object inlining in the java hotspot™ virtual machine](#)

 [Machine](#)

Christian Wimmer, Hanspeter Mössenböck

June 2007 **VEE '07: Proceedings of the 3rd international conference on Virtual execution environments**

Publisher: ACM

Full text available:  [pdf\(341.49 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

*Object inlining* is an optimization that embeds certain referenced objects into their referencing object. It reduces the costs of field accesses by eliminating unnecessary field loads. The order of objects in the heap is changed in such a way that ...

**Keywords:** cache, garbage collection, java, just-in-time compilation, object colocation, object inlining, optimization, performance

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### 3 [Adapting virtual machine techniques for seamless aspect support](#)

 [Christoph Bockisch, Matthew Arnold, Tom Dinkelaker, Mira Mezini](#)

October 2006 **ACM SIGPLAN Notices**, Volume 41 Issue 10

**Publisher:** ACM

Full text available:  pdf(266.90 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [cited by](#), [index terms](#)

Current approaches to compiling aspect-oriented programs are inefficient. This inefficiency has negative effects on the productivity of the development process and is especially prohibitive for dynamic aspect deployment. In this work, we present how ...

**Keywords:** aspect weaving, aspect-oriented programming, dynamic deployment, envelope-based weaving, virtual machine support

**4 A fast and generic hybrid simulation approach using C virtual machine**

 Lei Gao, Stefan Kraemer, Rainer Leupers, Gerd Ascheid, Heinrich Meyr  
September 2007 **CASES '07**: Proceedings of the 2007 international conference on Compilers, architecture, and synthesis for embedded systems

**Publisher:** ACM

Full text available:  pdf(576.43 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

*Instruction Set Simulators (ISSes)* are important tools for cross-platform software development. The simulation speed is a major concern and many approaches have been proposed to improve the performance of ISSes. A prevalent technique is compiled ...

**Keywords:** debugging, simulation, virtual machine

**5 Constructing a metacircular Virtual machine in an exploratory**

 programming environment  
David Ungar, Adam Spitz, Alex.Ausch  
October 2005 **OOPSLA '05**: Companion to the 20th annual ACM SIGPLAN conference on Object-oriented programming, systems, languages, and applications

**Publisher:** ACM

Additional Information: [full citation](#), [abstract](#), [references](#), [cited by](#), [index terms](#)  
Full text available:  pdf(755.82 KB)  mov(39:52 MIN)

Can virtual machine developers benefit from religiously observing the principles more often embraced for exploratory programming? To find out, we are concurrently constructing two artifacts--a Self VM entirely in Self (the Klein VM), and a specialized ...

**Keywords:** Klein, code reuse, debugger, exploratory programming, fix-and-continue, lenses, liveness, meta-recursive, metacircularity, mirror-based reflection, object oriented, prototypes, reactivity, remote reflection, self, virtual machine

**6 Optimizing indirect branch prediction accuracy in virtual machine**

 interpreters  
Kevin Casey, M. Anton Ertl, David Gregg  
October 2007 **ACM Transactions on Programming Languages and Systems (TOPLAS)**, Volume 29 Issue 6

**Publisher:** ACM

Full text available: [pdf\(715.97 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Interpreters designed for efficiency execute a huge number of indirect branches and can spend more than half of the execution time in indirect branch mispredictions. Branch target buffers (BTBs) are the most widely available form of indirect branch prediction; ...

**Keywords:** Interpreter, branch prediction, branch target buffer, code replication, superinstruction

## 7 Virtual machine showdown: Stack versus registers

 Yunhe Shi, Kevin Casey, M. Anton Ertl, David Gregg

January 2008 **ACM Transactions on Architecture and Code Optimization (TACO)**, Volume 4 Issue 4

**Publisher:** ACM

Full text available: [pdf\(2.15 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Virtual machines (VMs) enable the distribution of programs in an architecture-neutral format, which can easily be interpreted or compiled. A long-running question in the design of VMs is whether a stack architecture or register architecture can be implemented ...

**Keywords:** Interpreter, register architecture, stack architecture, virtual machine

## 8 Catenation and specialization for Tcl virtual machine performance

 Benjamin Vitale, Tarek S. Abdelrahman

June 2004 **IVME '04: Proceedings of the 2004 workshop on Interpreters, virtual machines and emulators**

**Publisher:** ACM

Full text available: [pdf\(188.95 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [cited by](#), [index terms](#)

We present techniques for eliminating dispatch overhead in a virtual machine interpreter using a lightweight just-in-time native-code compilation. In the context of the Tcl VM, we convert bytecodes to native Sparc code, by concatenating the native instructions ...

**Keywords:** Tcl, bytecode interpreters, just-in-time compilation, virtual machines

## 9 Virtual machine showdown: stack versus registers

 Yunhe Shi, David Gregg, Andrew Beatty, M. Anton Ertl

June 2005 **VEE '05: Proceedings of the 1st ACM/USENIX international conference on Virtual execution environments**

**Publisher:** ACM

Full text available: [pdf\(215.32 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Virtual machines (VMs) are commonly used to distribute programs in an architecture-neutral format, which can easily be interpreted or compiled. A long-running question in the design of VMs is whether stack architecture or

register architecture can be ...

**Keywords:** interpreter, register architecture, stack architecture, virtual machine

**10 Adapting virtual machine techniques for seamless aspect support**

 Christoph Bockisch, Matthew Arnold, Tom Dinkelaker, Mira Mezini  
October 2006 **OOPSLA '06**: Proceedings of the 21st annual ACM SIGPLAN conference on Object-oriented programming systems, languages, and applications

**Publisher:** ACM

Full text available:  [pdf\(266.90 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [cited by](#), [index terms](#)

Current approaches to compiling aspect-oriented programs are inefficient. This inefficiency has negative effects on the productivity of the development process and is especially prohibitive for dynamic aspect deployment. In this work, we present how ...

**Keywords:** aspect weaving, aspect-oriented programming, dynamic deployment, envelope-based weaving, virtual machine support

**11 Java object header elimination for reduced memory consumption in 64-bit virtual machines**

 Kris Venstermans, Lieven Eeckhout, Koen De Bosschere  
September 2007 **ACM Transactions on Architecture and Code Optimization (TACO)**, Volume 4 Issue 3

**Publisher:** ACM

Full text available:  [pdf\(722.38 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Memory performance is an important design issue for contemporary computer systems given the huge processor/memory speed gap. This paper proposes a space-efficient Java object model for reducing the memory consumption of 64-bit Java virtual machines. ...

**Keywords:** 64-bit implementation, Java object model, Virtual machine, implicit typing, typed virtual addressing

**12 Speculative optimization using hardware-monitored guarded regions for java virtual machines**

 Lixin Su, Mikko H. Lipasti  
June 2007 **VEE '07**: Proceedings of the 3rd international conference on Virtual execution environments

**Publisher:** ACM

Full text available:  [pdf\(357.43 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Aggressive dynamic optimization in high-performance Java Virtual Machines can be hampered by language features like Java's exception model, which requires precise detection and handling of program-generated exceptions. Furthermore, the compile-time overhead ...

**Keywords:** java, precise exceptions, speculative processors, transactional

memory, virtual machines

**13** PyPy's approach to virtual machine construction

 Armin Rigo, Samuele Pedroni

October 2006 **OOPSLA '06**: Companion to the 21st ACM SIGPLAN conference on Object-oriented programming systems, languages, and applications

**Publisher:** ACM

Full text available:  [pdf\(254.60 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [cited by](#), [index terms](#)

The PyPy project seeks to prove both on a research and a practical level the feasibility of constructing a virtual machine (VM) for a dynamic language in a dynamic language - in this case, Python. The aim is to translate (i.e. compile) the VM to arbitrary ...

**Keywords:** Python, metacircularity, retargettable code generation, type inference, virtual machine

**14** Impact of virtual execution environments on processor energy

 consumption and hardware adaptation

Shiwen Hu, Lizy K. John

June 2006 **VEE '06**: Proceedings of the 2nd international conference on Virtual execution environments

**Publisher:** ACM

Full text available:  [pdf\(306.86 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

During recent years, microprocessor energy consumption has been surging and efforts to reduce power and energy have received a lot of attention. At the same time, virtual execution environments (VEEs), such as Java virtual machines, have grown in popularity. ...

**Keywords:** energy efficiency, hardware adaptation, power dissipation

**15** Design and implementation of a comprehensive real-time java virtual

 machine

Joshua Auerbach, David F. Bacon, Bob Blainey, Perry Cheng, Michael Dawson, Mike Fulton, David Grove, Darren Hart, Mark Stodley

September 2007 **EMSOFT '07**: Proceedings of the 7th ACM & IEEE international conference on Embedded software

**Publisher:** ACM

Full text available:  [pdf\(405.84 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The emergence of standards for programming real-time systems in Java has encouraged many developers to consider its use for systems previously only built using C, Ada, or assembly language. However, the RTSJ standard in isolation leaves many important ...

**Keywords:** AOT, JIT, JVM, garbage collection, java, real time

**16**

Heap compression for memory-constrained Java environments

 G. Chen, M. Kandemir, N. Vijaykrishnan, M. J. Irwin, B. Mathiske, M. Wolczko  
October 2003 **OOPSLA '03**: Proceedings of the 18th annual ACM SIGPLAN conference on Object-oriented programming, systems, languages, and applications

**Publisher:** ACM

Full text available:  [pdf\(2.14 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [cited by](#), [index terms](#)

Java is becoming the main software platform for consumer and embedded devices such as mobile phones, PDAs, TV set-top boxes, and in-vehicle systems. Since many of these systems are memory constrained, it is extremely important to keep the memory footprint ...

**Keywords:** Java virtual machine, garbage collection, heap, memory compression

**17** Dynamic code management: improving whole program code locality in managed runtimes

 Xianglong Huang, Brian T Lewis, Kathryn S McKinley  
June 2006 **VEE '06**: Proceedings of the 2nd international conference on Virtual execution environments

**Publisher:** ACM

Full text available:  [pdf\(153.03 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Poor code locality degrades application performance by increasing memory stalls due to instruction cache and TLB misses. This problem is particularly an issue for large server applications written in languages such as Java and C# that provide just-in-time ...

**Keywords:** code generation, code layout, dynamic optimization, locality, performance monitoring, virtual machines

**18** Compiler and runtime support for efficient software transactional memory

 Ali-Reza Adl-Tabatabai, Brian T. Lewis, Vijay Menon, Brian R. Murphy, Bratin Saha, Tatiana Shpeisman  
June 2006 **ACM SIGPLAN Notices**, Volume 41 Issue 6

**Publisher:** ACM

Full text available:  [pdf\(211.55 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [cited by](#), [index terms](#)

Programmers have traditionally used locks to synchronize concurrent access to shared data. Lock-based synchronization, however, has well-known pitfalls: using locks for fine-grain synchronization and composing code that already uses locks are both difficult ...

**Keywords:** code generation, compiler optimizations, locking, synchronization, transactional memory, virtual machines

**19** Prefetch injection based on hardware monitoring and object metadata

 Ali-Reza Adl-Tabatabai, Richard L. Hudson, Mauricio J. Serrano, Sreenivas Subramoney  
June 2004 **PLDI '04**: Proceedings of the ACM SIGPLAN 2004 conference on Programming language design and implementation

**Publisher:** ACM

Full text available:  [pdf\(288.00 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [cited by](#), [index terms](#)

Cache miss stalls hurt performance because of the large gap between memory and processor speeds - for example, the popular server benchmark SPEC JBB2000 spends 45% of its cycles stalled waiting for memory requests on the Itanium® 2 processor. Traversing ...

**Keywords:** cache misses, compiler optimization, garbage collection, prefetching, profile-guided optimization, virtual machines

**20** [Design, implementation, and evaluation of a compilation server](#)

 Han B. Lee, Amer Diwan, J. Eliot B. Moss

August 2007 **ACM Transactions on Programming Languages and Systems (TOPLAS)**, Volume 29 Issue 4

**Publisher:** ACM

Full text available:  [pdf\(323.48 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Modern JVM implementations interleave execution with compilation of "hot" methods to achieve reasonable performance. Since compilation overhead impacts the execution time of the application and induces run-time pauses, we explore offloading ...

**Keywords:** Compilation server, Java virtual machine

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